BTO Multi-Year Program Plan and Goals

Evolution & Analysis

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Joanne Lowry – BTO
Jack Mayernik – NREL
Jared Langevin – LBNL
Ben Polly – NREL

Logic Models

http://energy.gov/eere/buildings/downloads/multi-year-program-plan

Multi-Year Program Plan (MYPP)

MYPP Content

Building Sector Overview

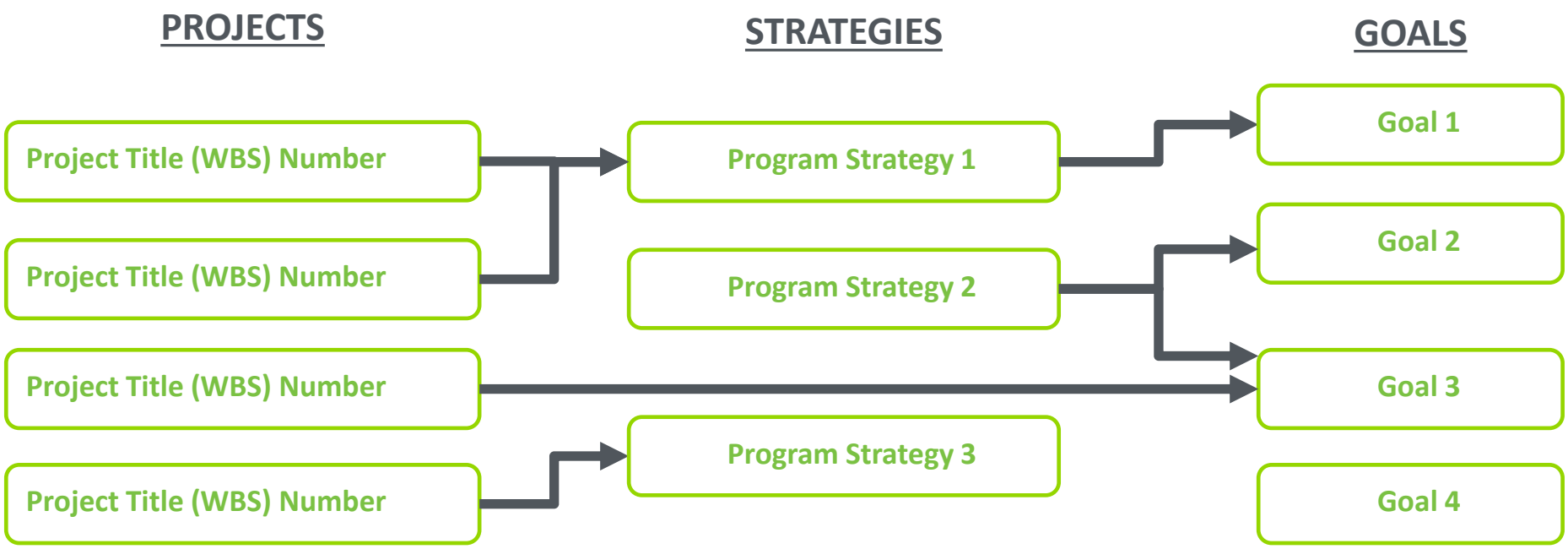
- Sector Structure
- Select Statistics
- Key Challenges

Description of Program

- Objectives
- Strategies
- Goals

http://energy.gov/eere/buildings/downloads/multi-year-program-plan

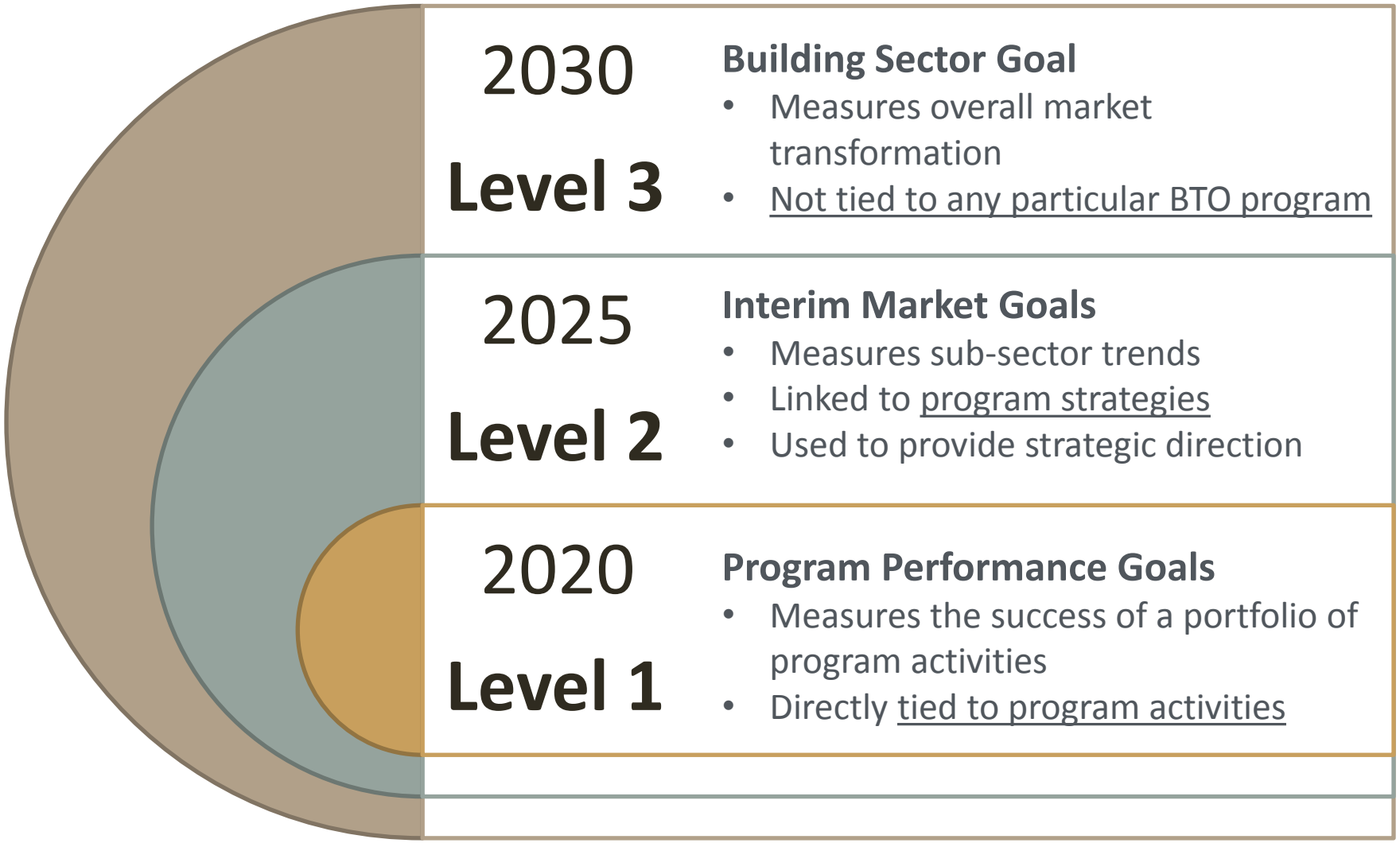
Connecting Projects, Strategies and Goals



BTO considers both the success of individual projects as well as the overall composition of its entire portfolio of work

Graphic courtesy of Navigant Consulting

Visualizing BTO's Goals Framework



Upcoming Reports and Future Engagement

Engagement Opportunities

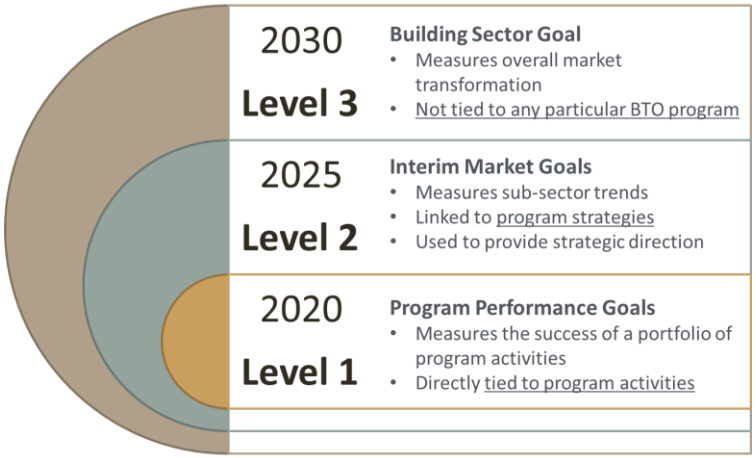
- Peer Review Sessions:
  - Residential Roundtable *(Tuesday, 9:00-10:00)*
  - Zero Energy Buildings *(Tuesday, 11:00-12:30)*
  - Buildings-to-Grid Roadmap *(Tuesday, 1:30-5:00)*
  - Scout *(Tuesday, 4:00-5:00)*
  - BTO International *(Wednesday, 9:00-10:30)*
  - Cities and Communities *(Wednesday, 9:00-10:30)*

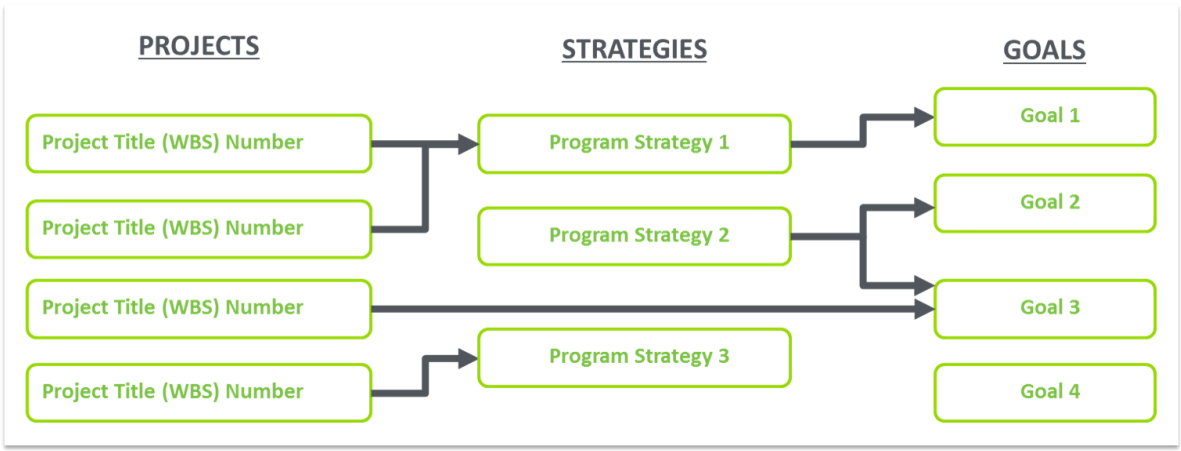
Upcoming Reports

- Technology Commercialization Report
- BTO Goals Report
- Impact Evaluation of HVAC R&D
- Building Code Field Study Report

To Stay Informed Sign Up At:
energy.gov/eere/buildings/subscribe-building-technologies-office-updates

Setting Priorities and Assessing Success





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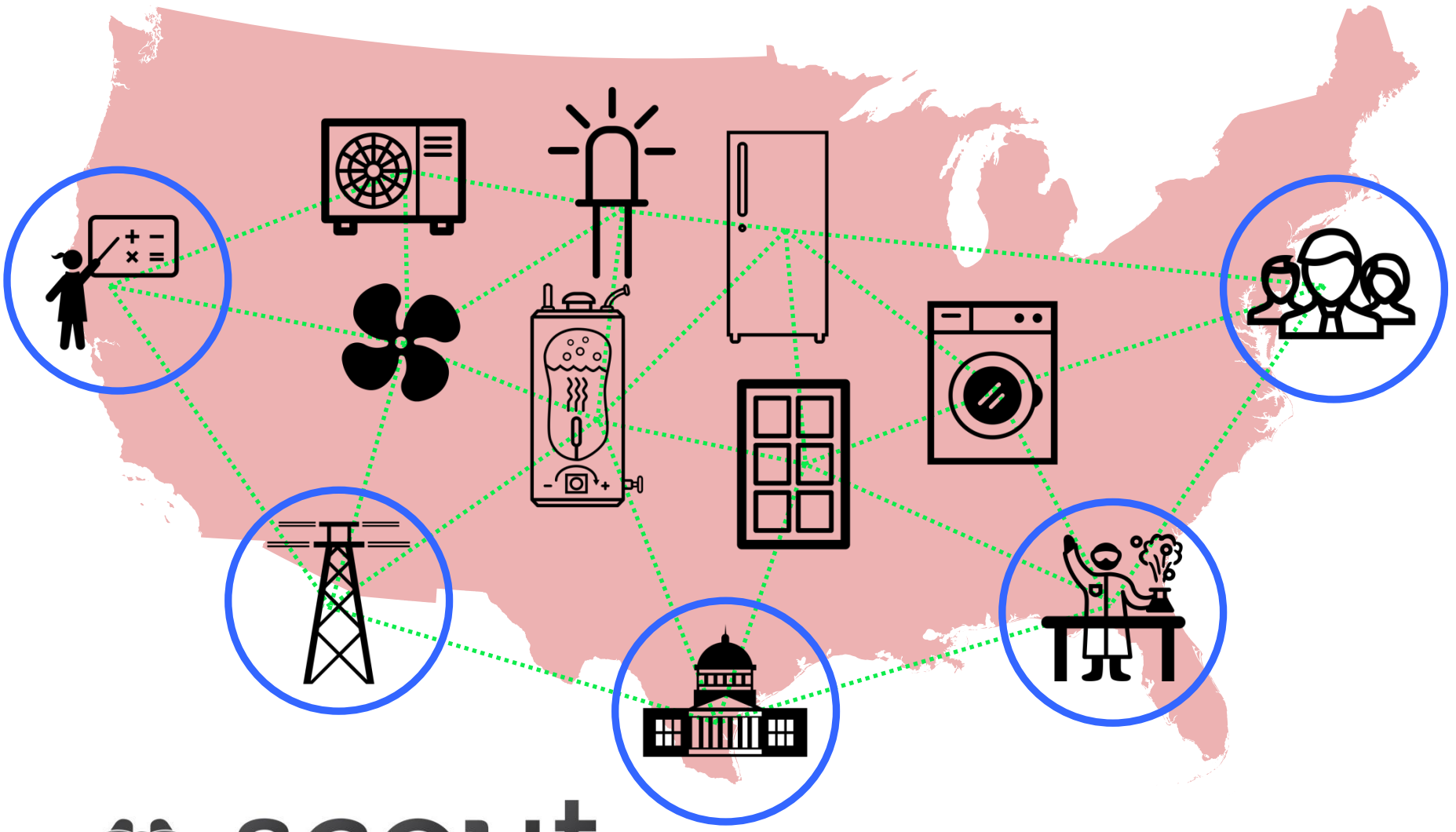
Scout: A common framework for energy impact analysis



scout

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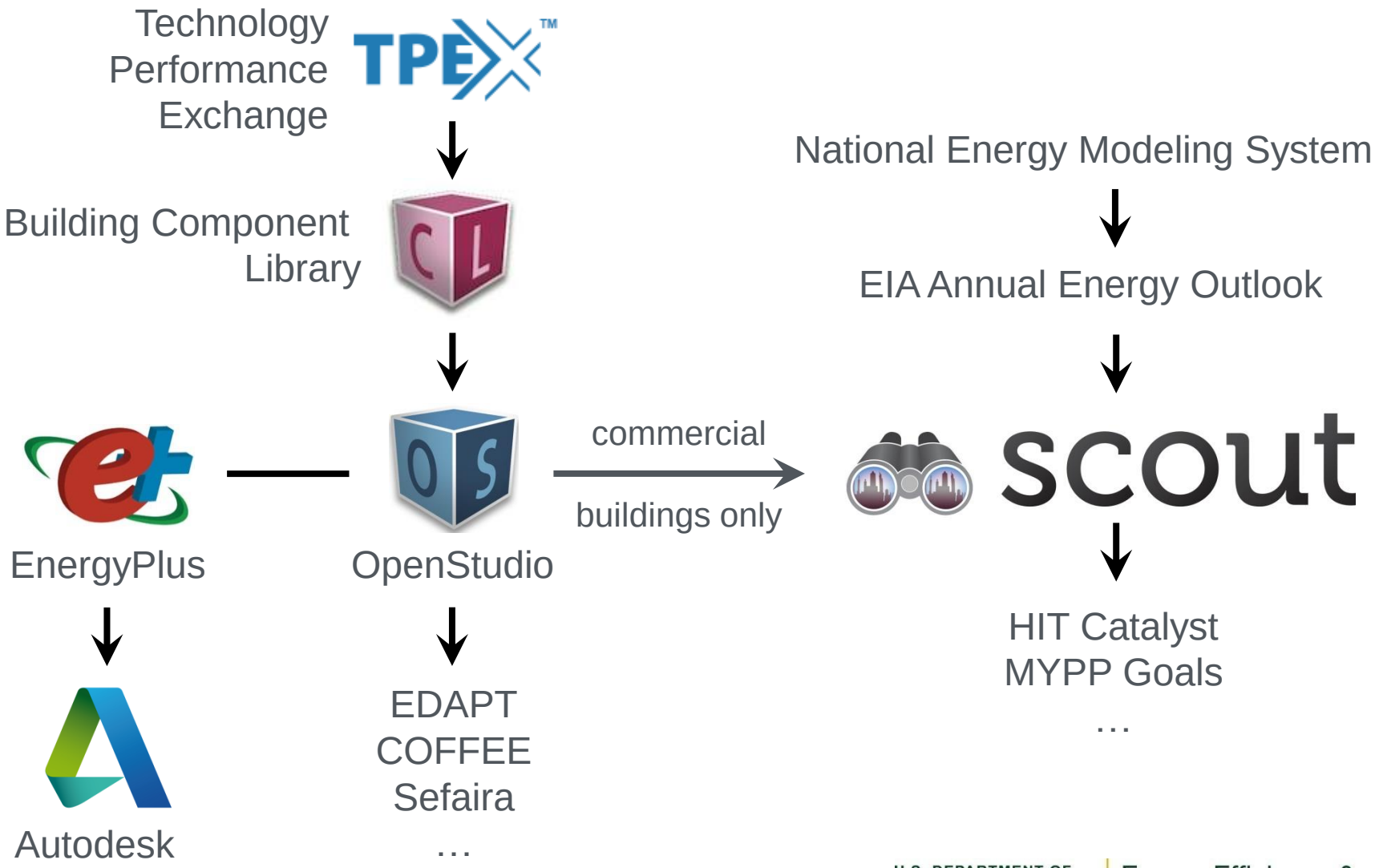
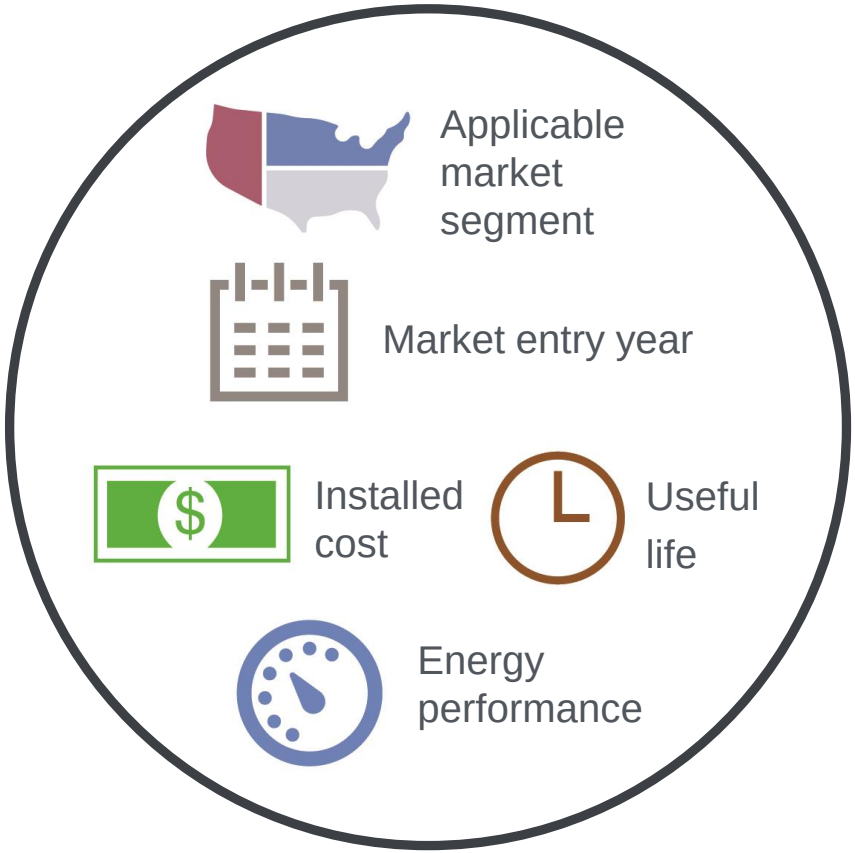
Scout fits into larger BTO energy modeling work flows



Unit of analysis: Energy conservation measures (ECMs)

ECMs improve upon the energy performance of a comparable baseline technology or approach



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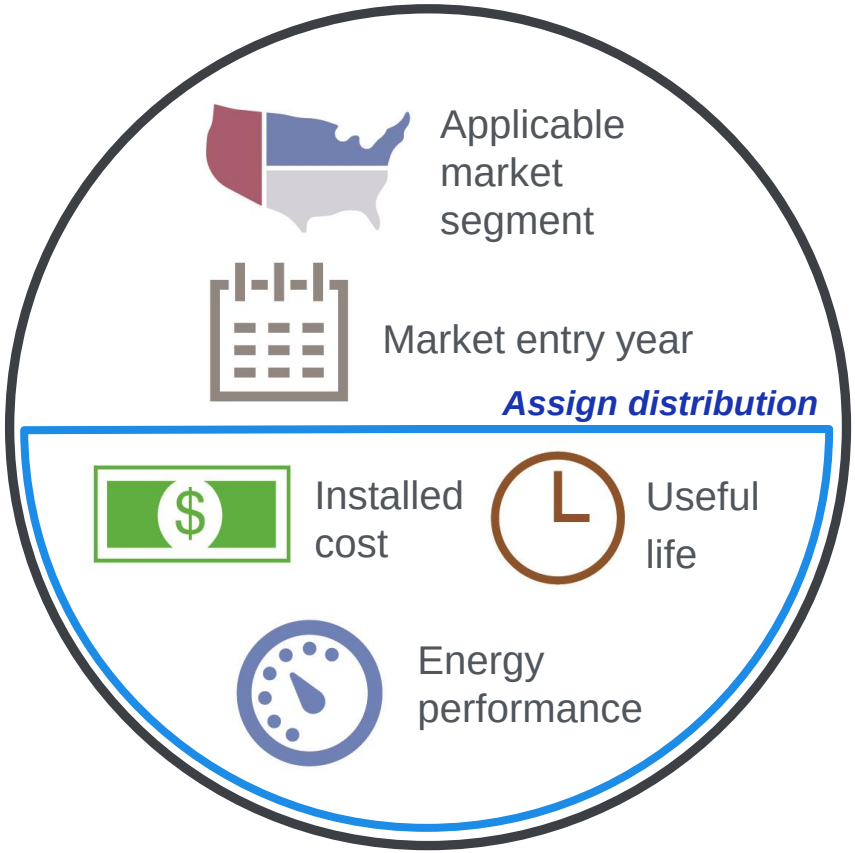

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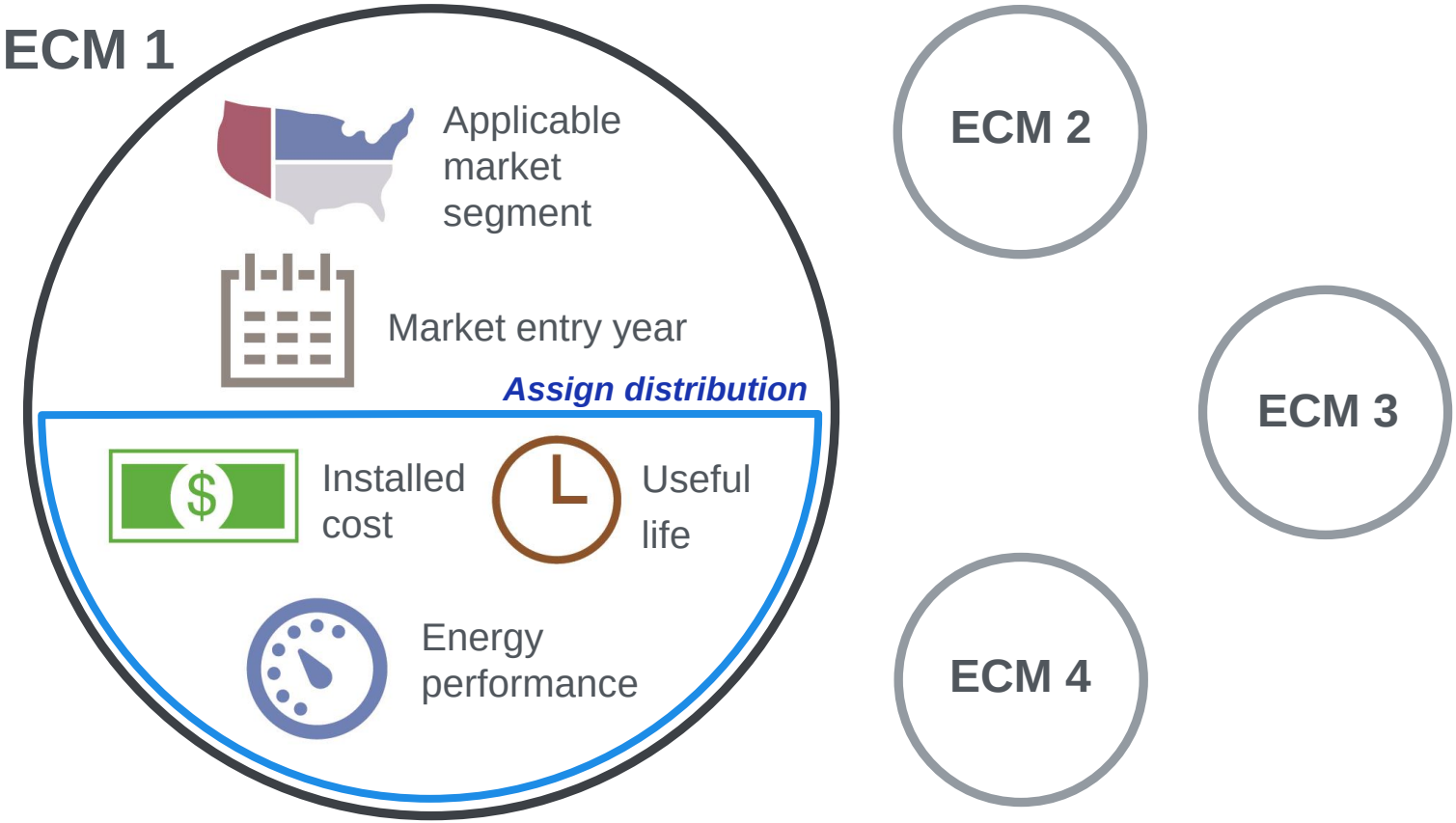

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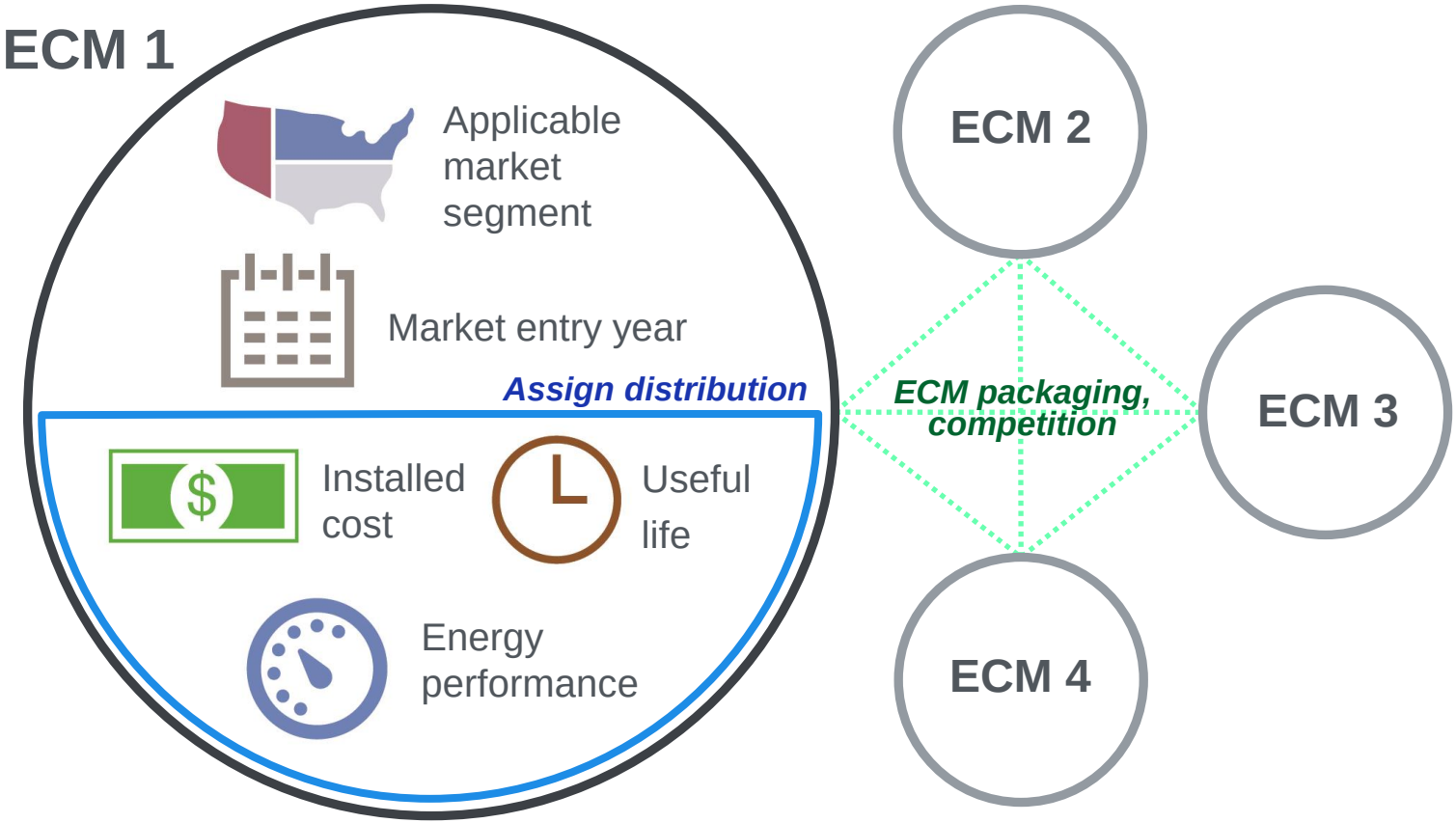

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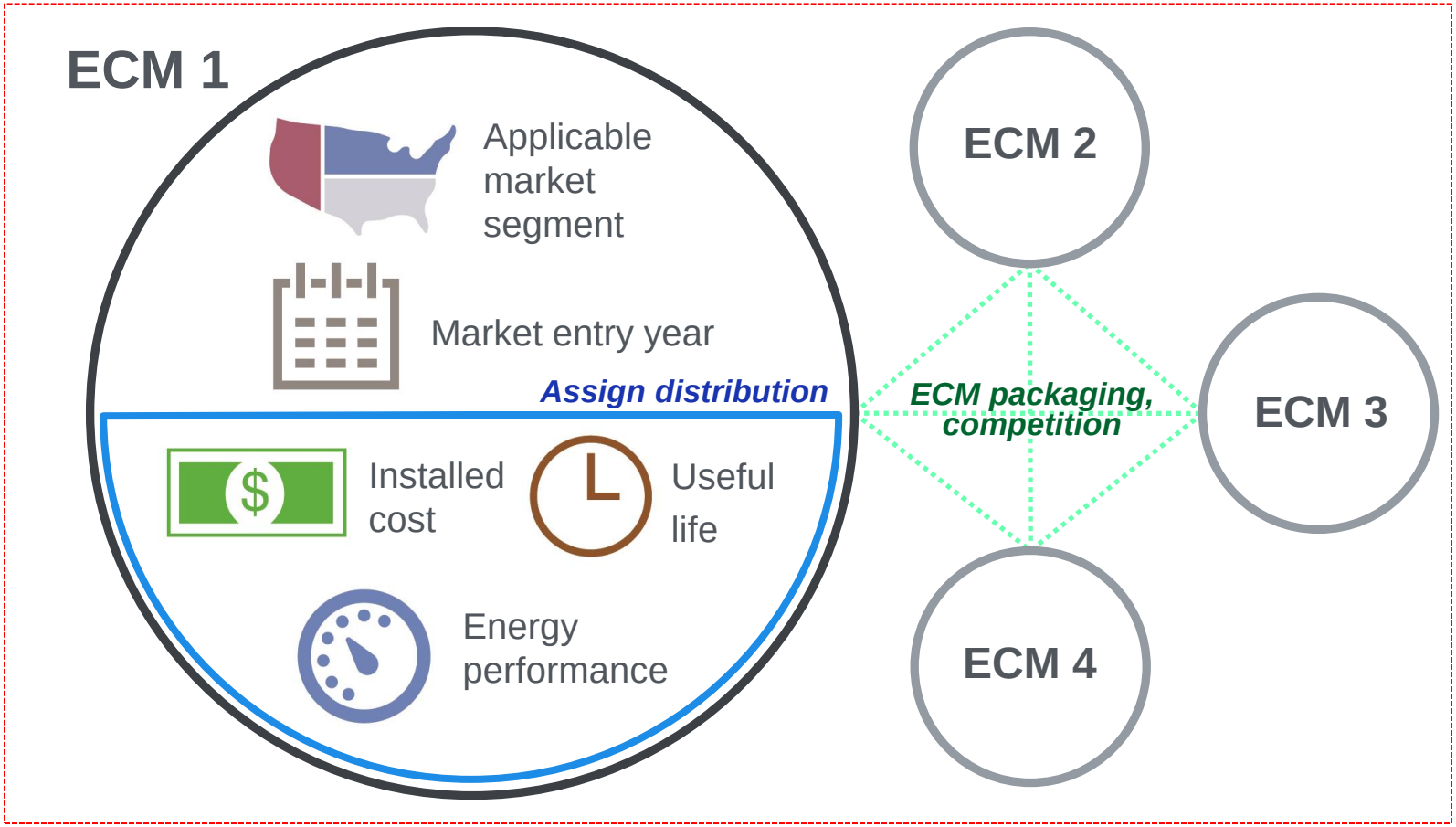
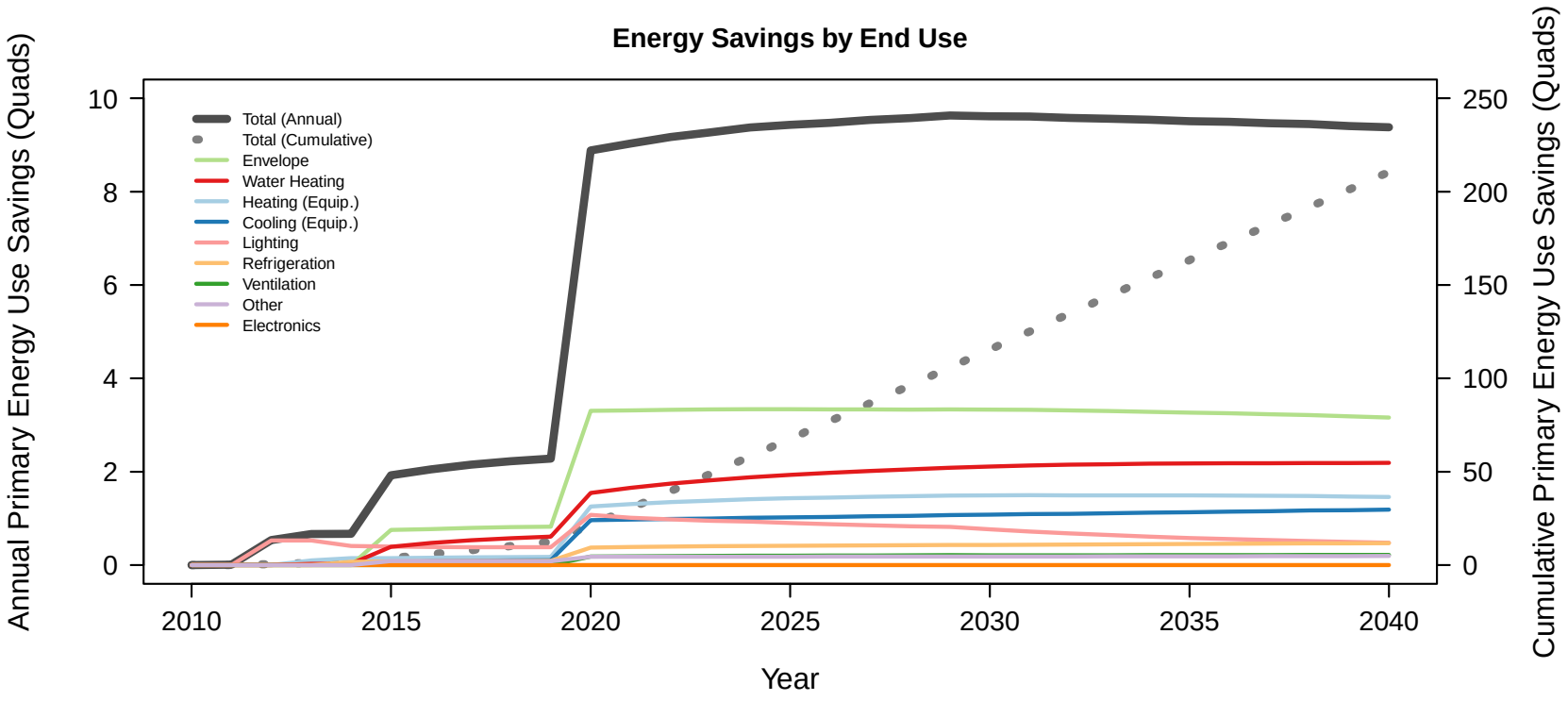


ECM aggregation (portfolio)

Scout yields data-driven answers to planning questions

How much (energy/CO_2/cost) can be saved for a given (climate zone/building class/end use)?



*Assuming ECMs can fully replace baseline market overnight

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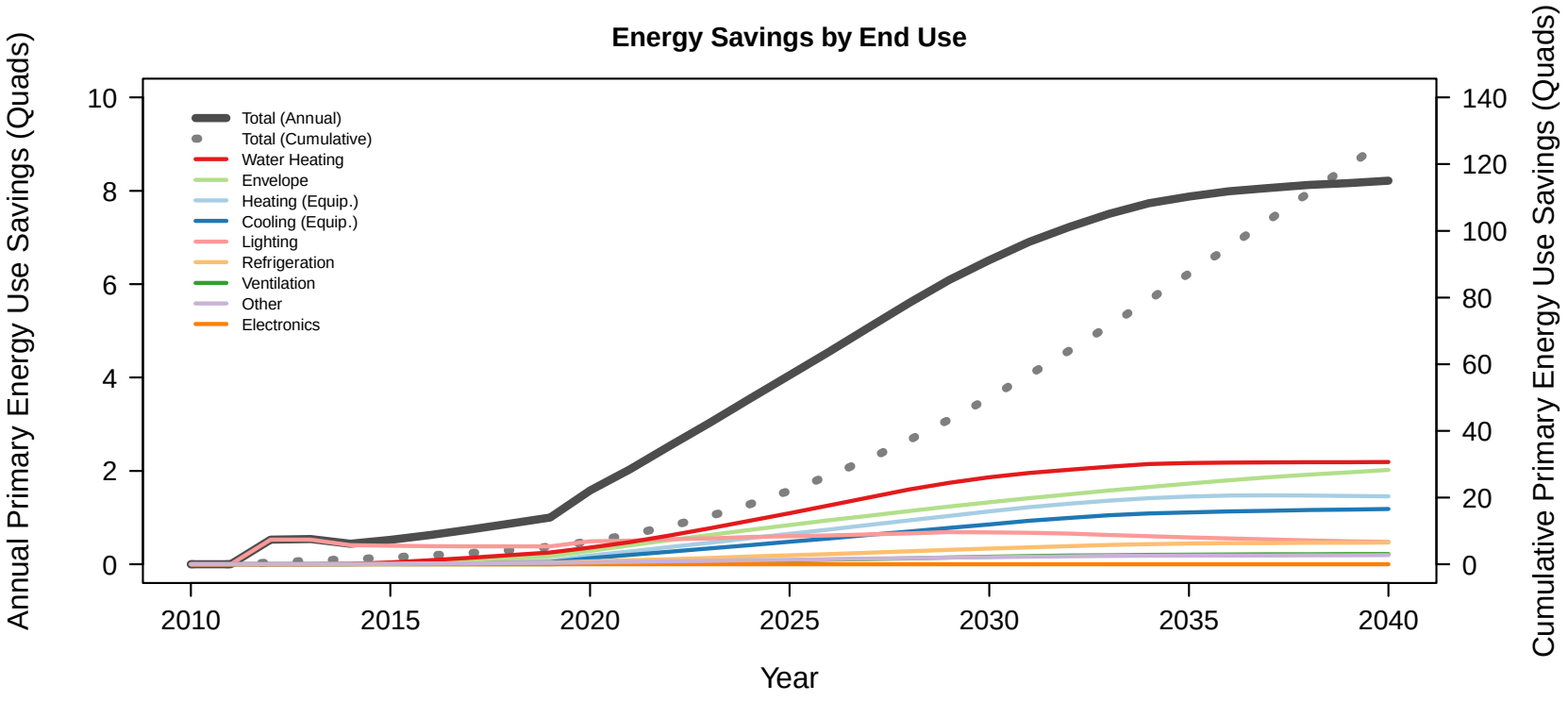
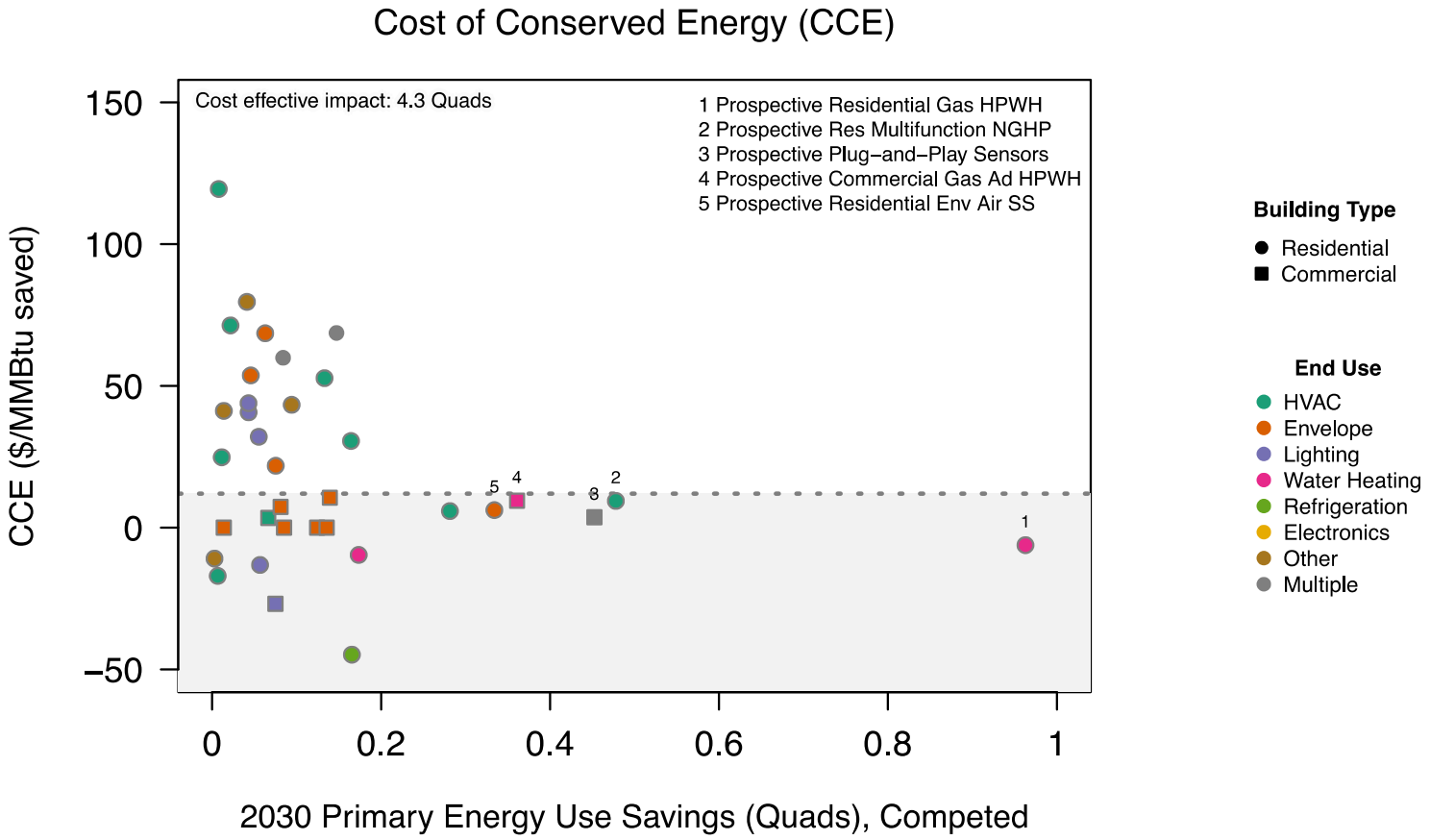


*Assuming ECMs replace new/replacement/retrofit portion of baseline mkt.

Scout yields data-driven answers to planning questions

What is the total cost-effective (energy/CO_2/cost) impact potential for a portfolio of ECMs?



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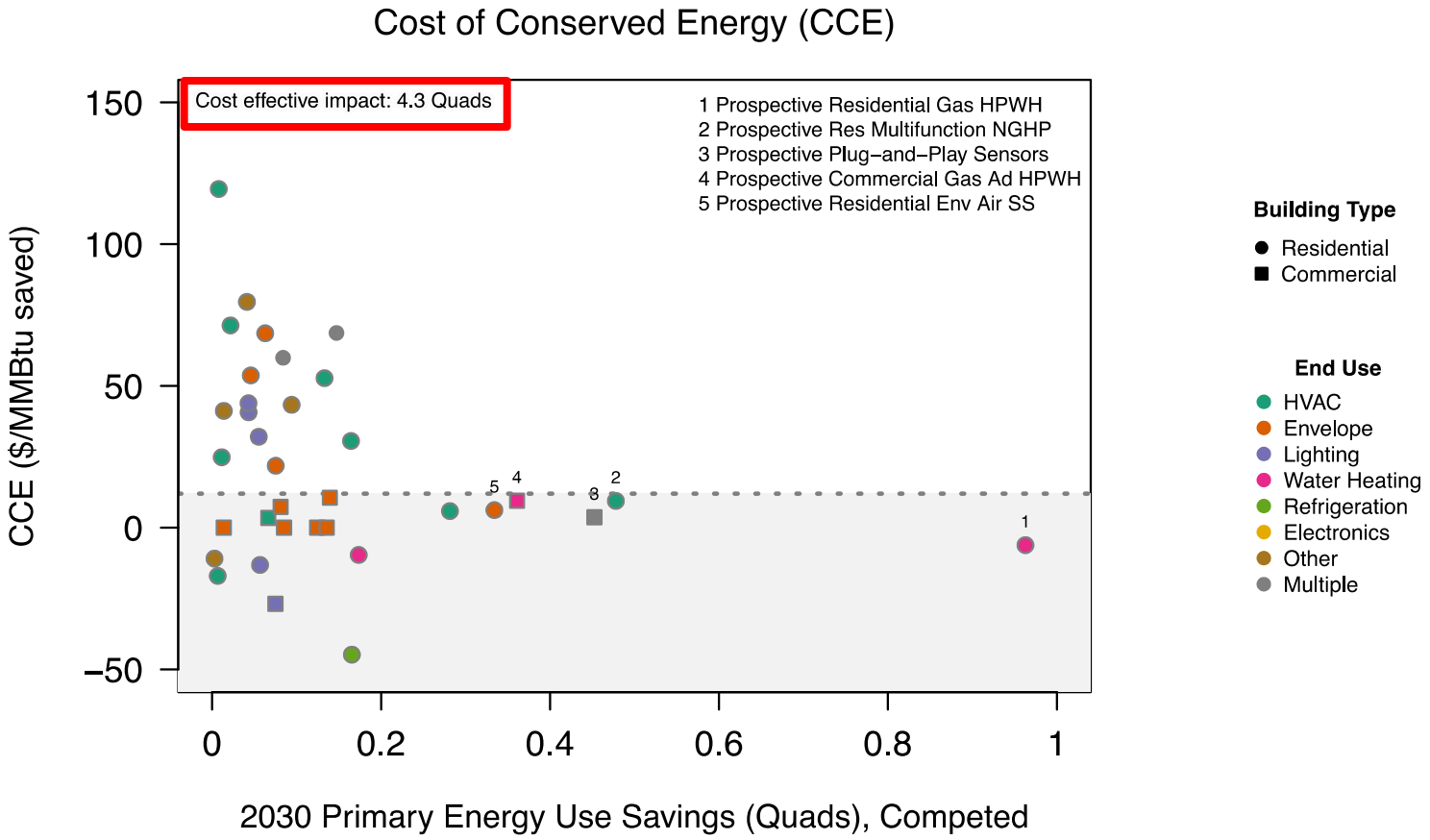

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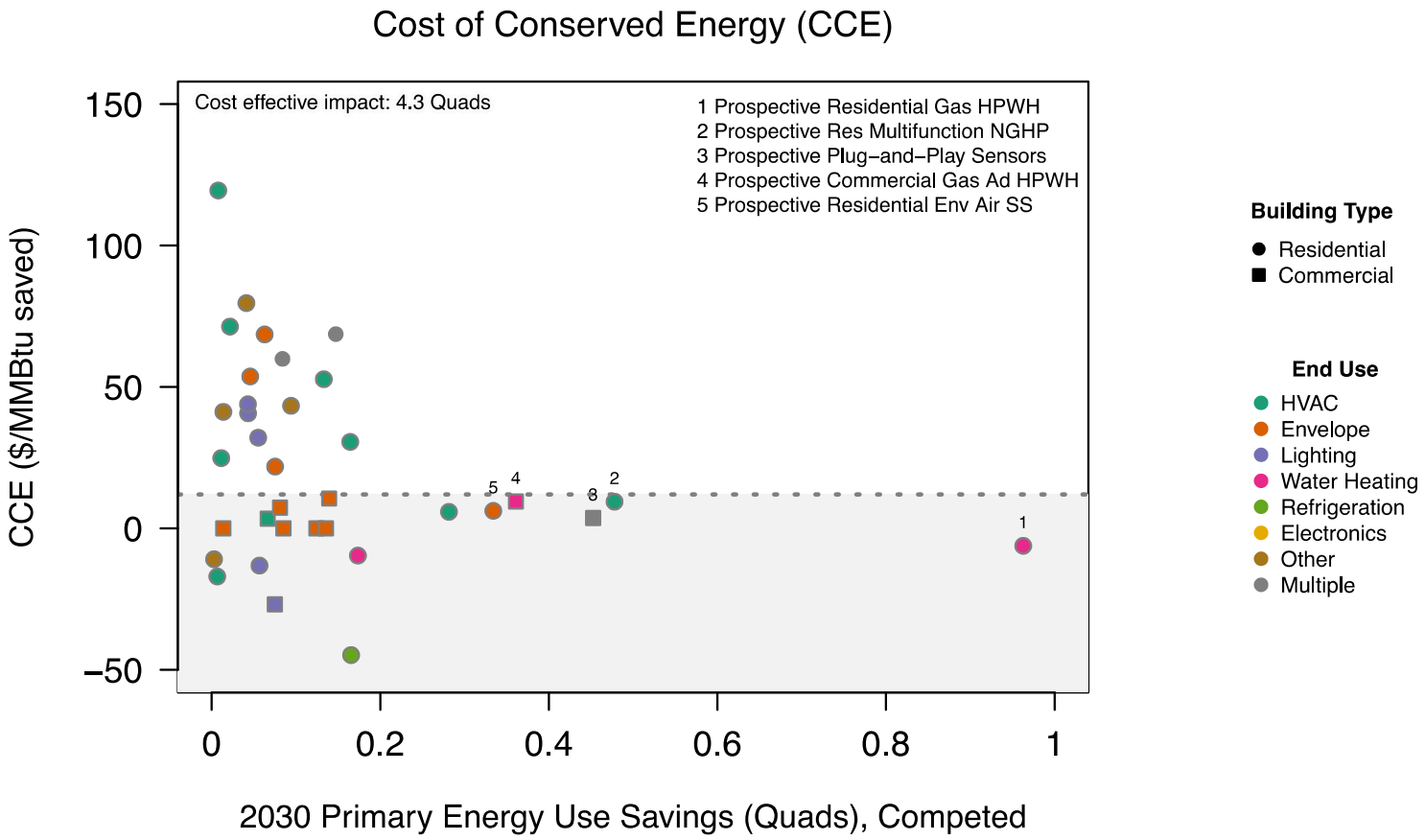
Which ECMs yield largest cost-effective (energy/CO_2/cost) impacts?



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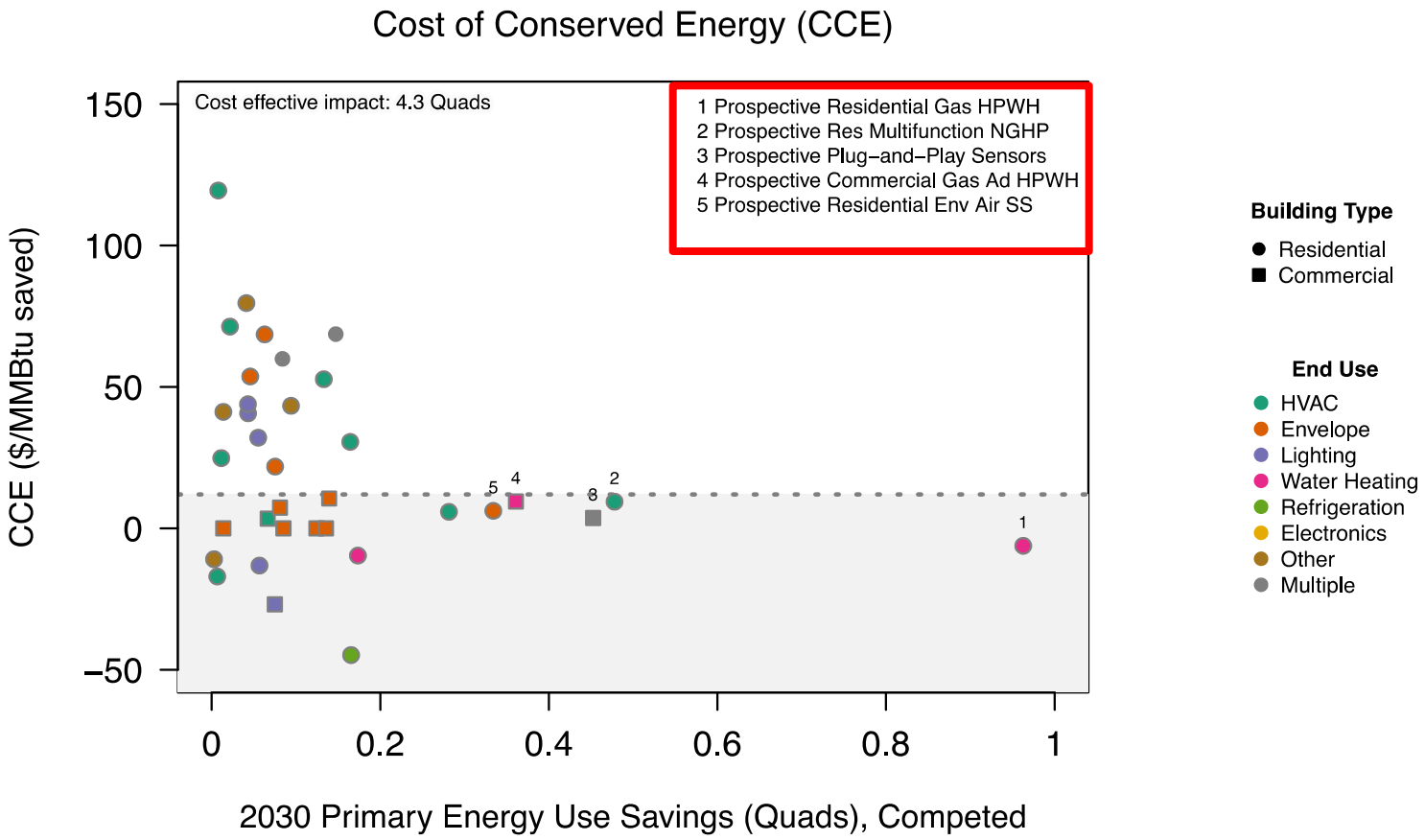
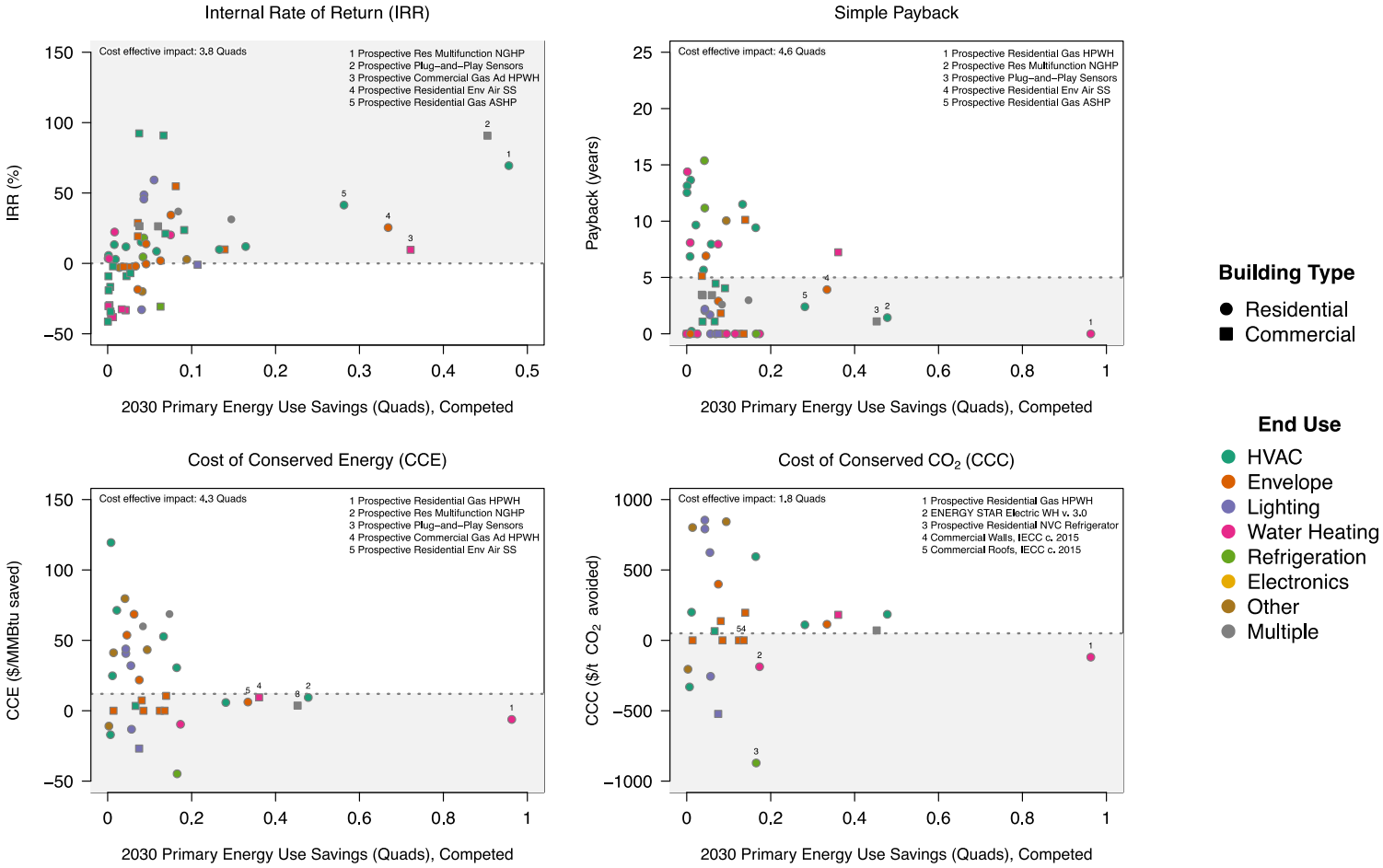


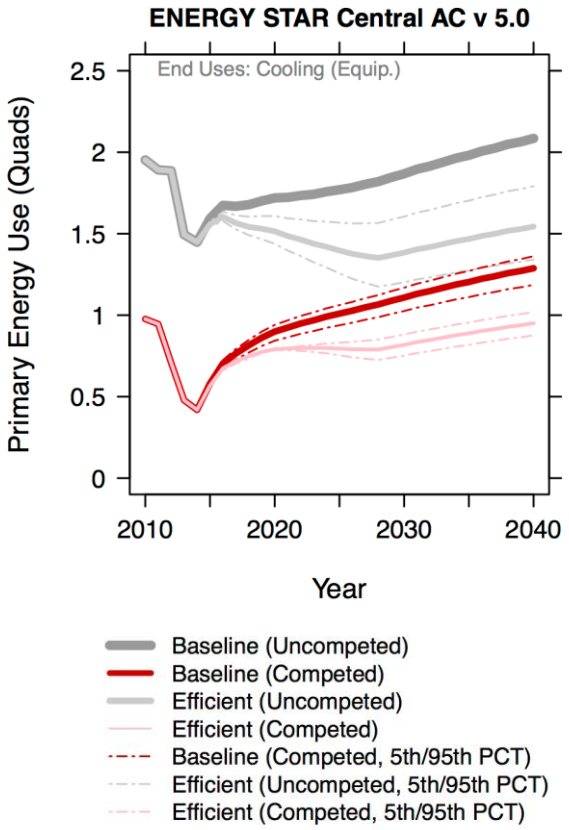
Scout yields data-driven answers to planning questions

Cost effectiveness metrics: IRR, payback, cost of conserved energy/CO_2



Scout yields data-driven answers to planning questions

How much (energy/CO_2/cost) can be saved for a given (ECM)?



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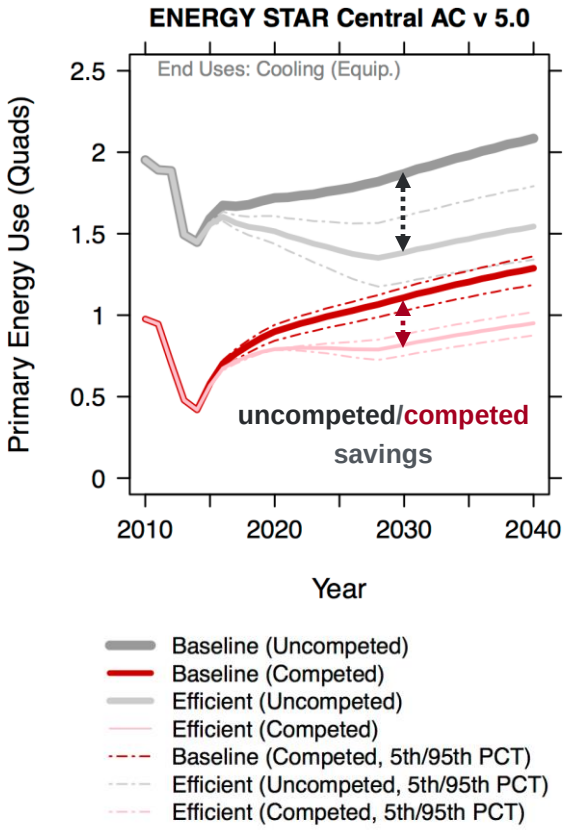

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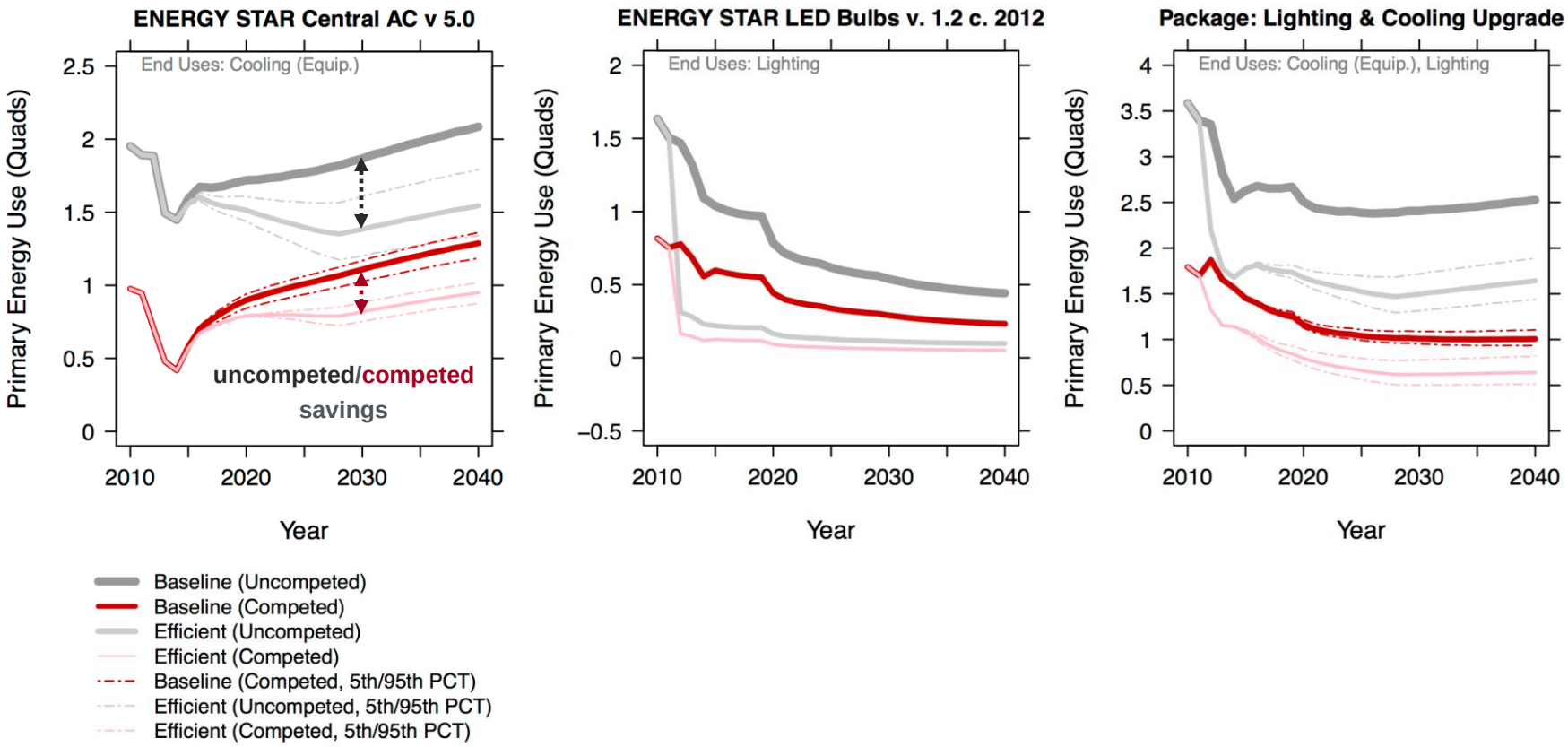

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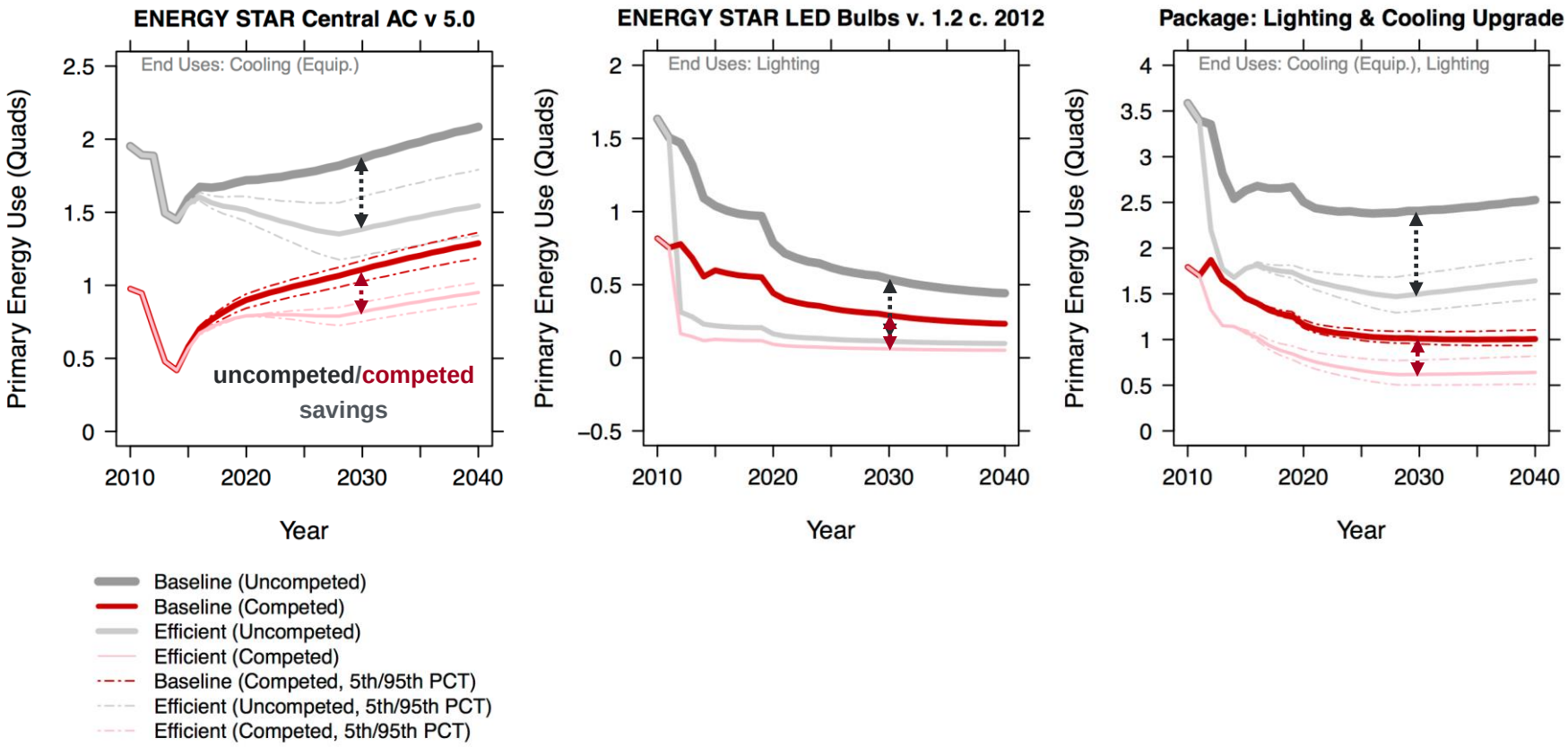


Scout may be useful to a broader analysis community

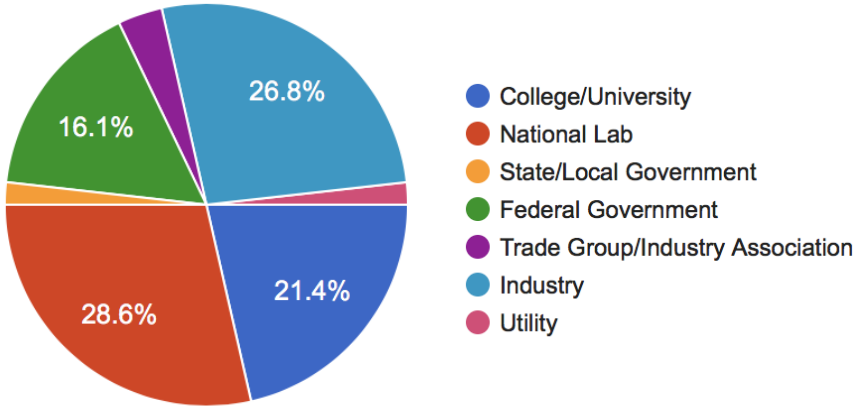
Academics, national labs, and industry partners can use Scout to communicate the larger-scale benefits of R&D breakthroughs

Other federal agencies can use Scout to estimate the potential impacts of funding in achieving energy savings goals

Utilities can use Scout to develop net program savings estimates and corresponding budget allocations / ECM incentives

Scout may be useful to a broader analysis community

- **Future plans**
  - Beta testing/public release of Scout analysis engine
  - Web UI for browsing ECMs and visualizing results
  - Continued development and management via Github



BTO is distributing a beta release of Scout to a targeted mix of stakeholders (N=57).

Find out more about Scout results, methods, and ongoing development tasks at tomorrow's Scout session, 4-5:30 PM, Wilson Ballroom

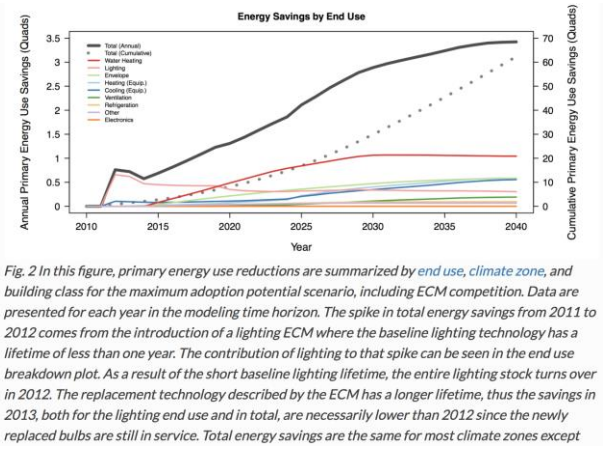


Fig. 2 In this figure, primary energy use reductions are summarized by end use, climate zone, and building class for the maximum adoption potential scenario, including ECM competition. Data are presented for each year in the modeling time horizon. The spike in total energy savings from 2011 to 2012 comes from the introduction of a lighting ECM where the baseline lighting technology has a lifetime of less than one year. The contribution of lighting to that spike can be seen in the end use breakdown plot. As a result of the short baseline lighting lifetime, the entire lighting stock turns over in 2012. The replacement technology described by the ECM has a longer lifetime, thus the savings in 2013, both for the lighting end use and in total, are necessarily lower than 2012 since the newly replaced bulbs are still in service. Total energy savings are the same for most climate zones except

Learn how Scout works, how to run an analysis, and how to contribute: https://github.com/trynthink/scout.

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Goals - Motivation

- Why goals are important
  - Measuring/assessing progress

- Why these goals are important
  - Saving money
  - Creating jobs
  - Improving quality of life

Key Elements of BTO's Goals Framework

- **Common Baseline Year**: 2010
  - A common, fixed baseline enables linkages among all goals and multi-year tracking
- **Primary Metric**: Energy use intensity (EUI) measured as primary energy use per square foot
  - Measure of energy efficiency
  - Widely used indicator of building efficiency trends
  - Flexible – it is applicable to sectors, buildings, and specific end uses
  - EUI trends regularly reported and forecast by EIA
- **Tiered Goals**:
  - **Building Sector (2030 and beyond)** – Ultimate outcome BTO is working to bring about
  - **Interim Market (2020 and 2025)** – Strategically focused outcomes that highlight how BTO's activities link to the building sector
  - **Program Performance (2015-2020)** – Key outputs or near-term outcomes of BTO's planned program activities

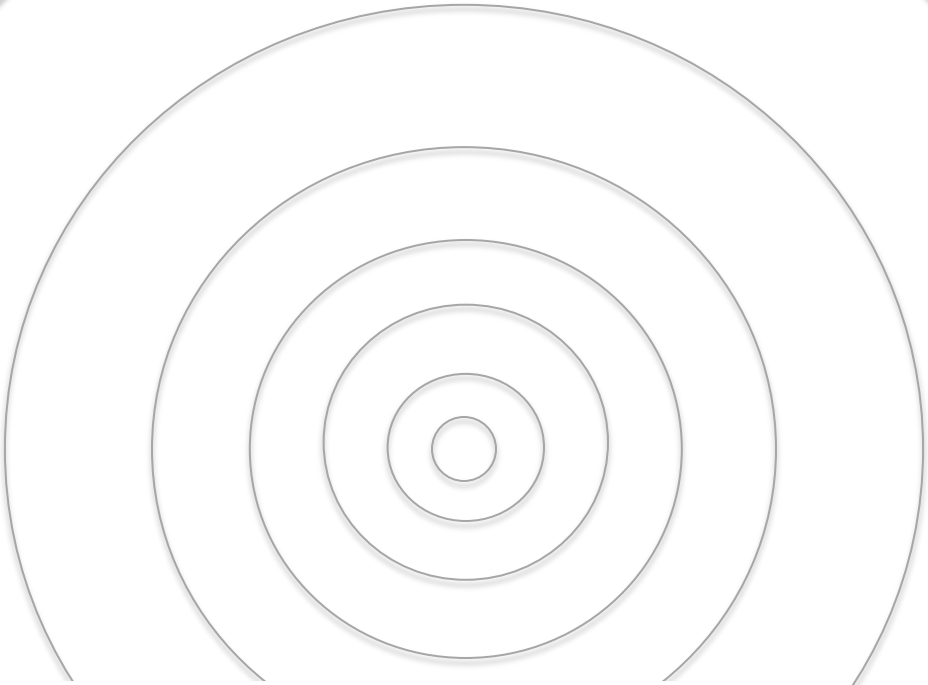
Visualizing BTO's Goals Framework

2020

Level 1

- **Program Performance Goals**
- Used to track program performance
- *Directly tied to the activities implemented by the program*

Visualizing BTO's Goals Framework

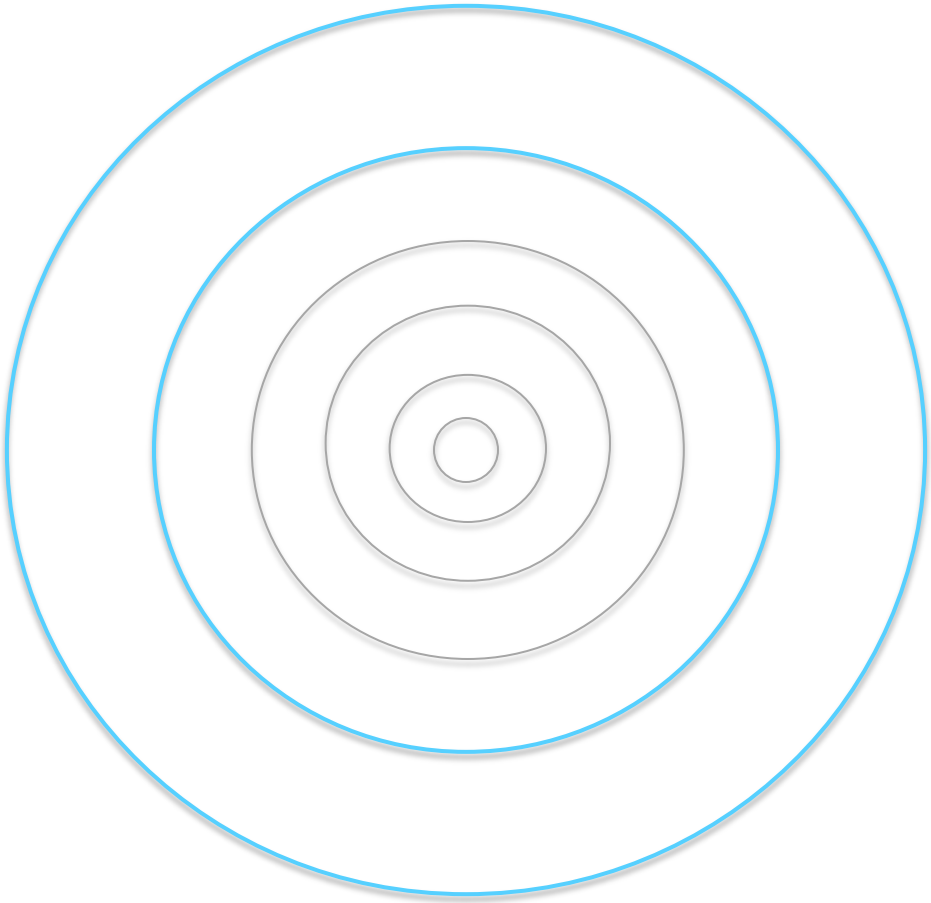


2030

Level 3

- **Building Sector Goals**
- Used for external communication
- Not tied to any particular program – *focused on the entire buildings sector*

Visualizing BTO's Goals Framework



2025

Level 2

- **Interim Market Goals**
- Used to provide strategic direction
- Linked to program strategies

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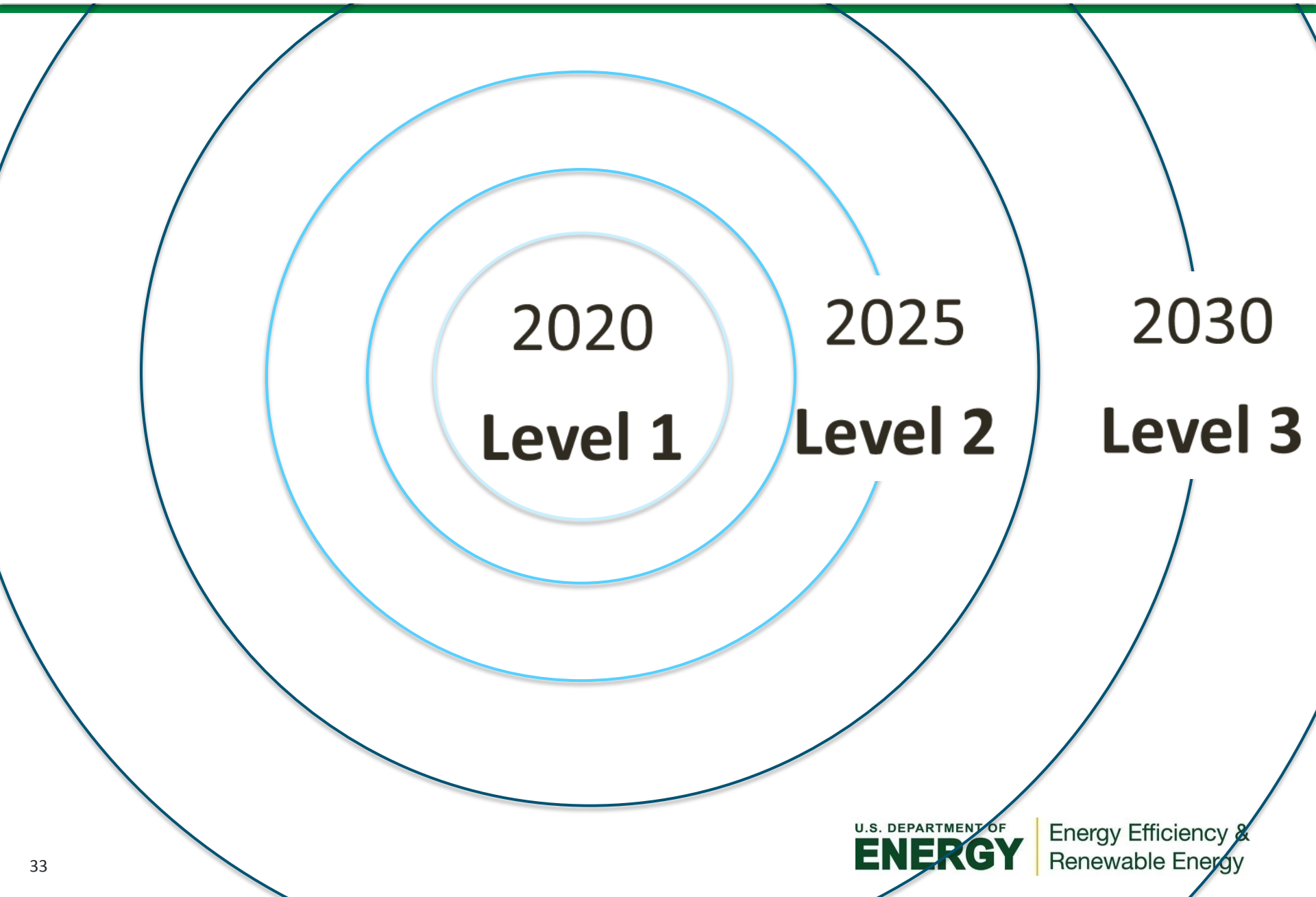
Visualizing BTO's Goals Framework



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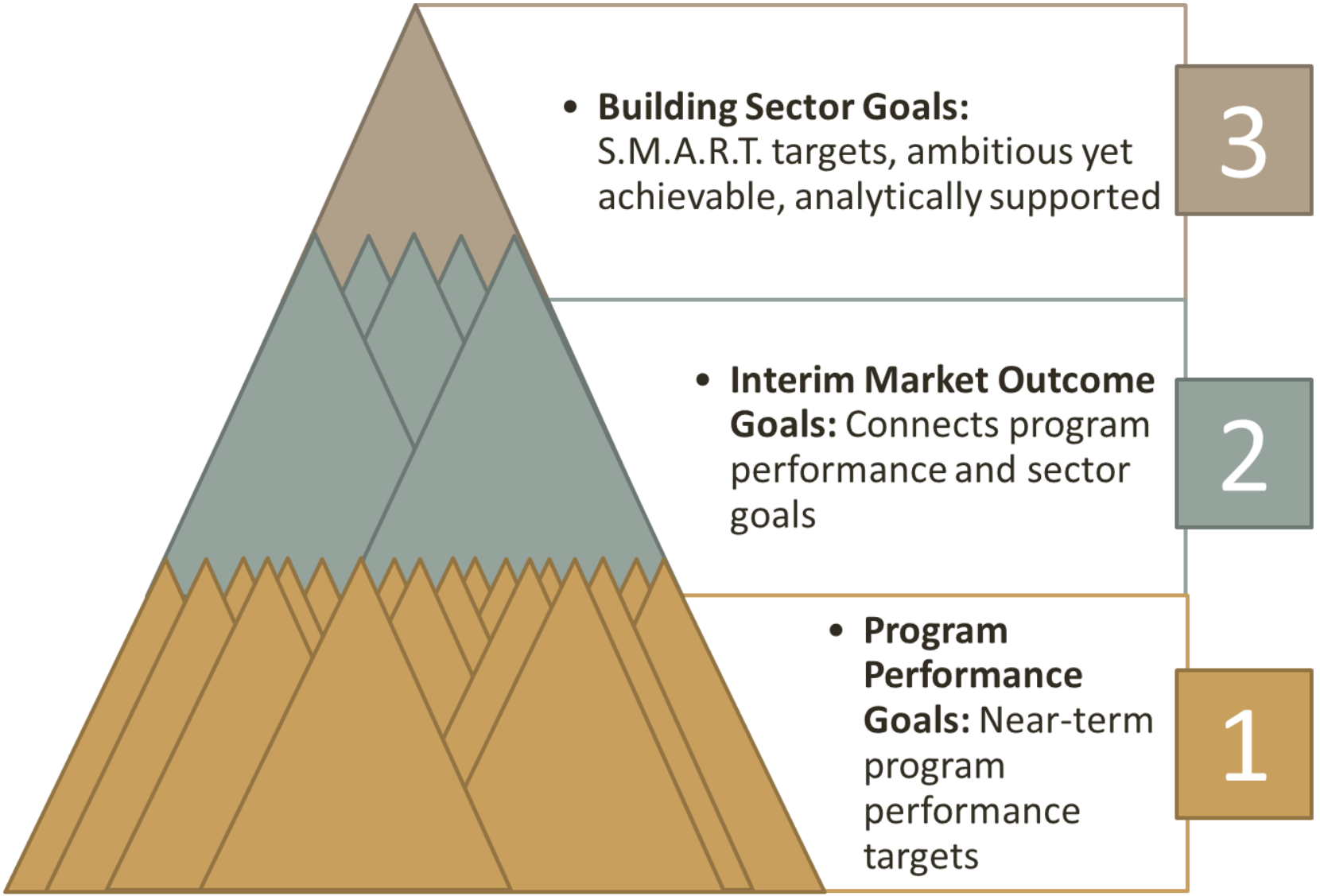
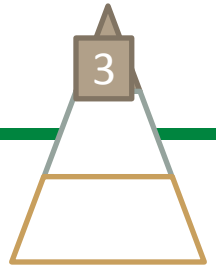


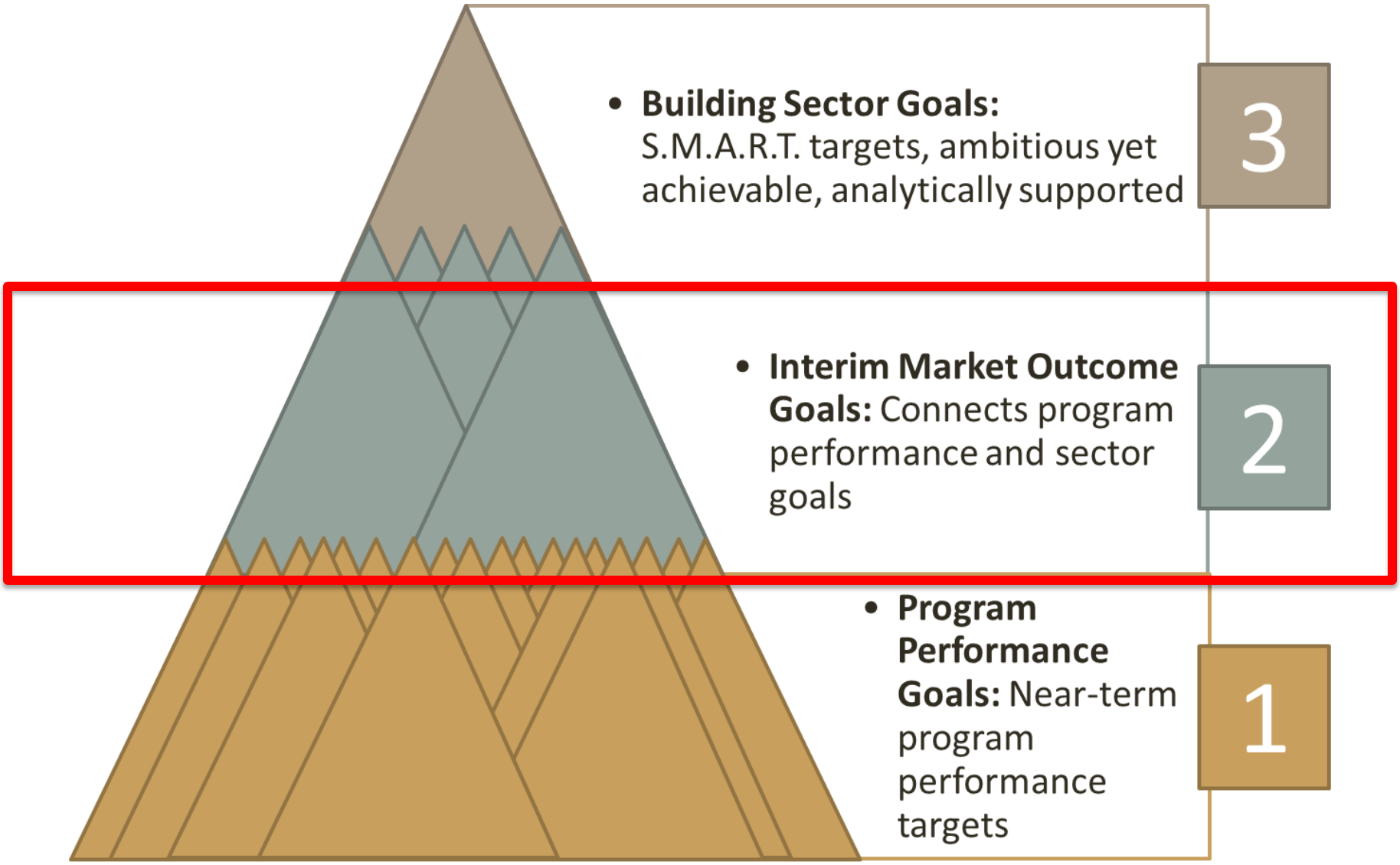
Visualizing BTO's Goals Framework

BTO's Building Sector Goal

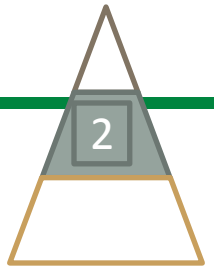


By 2030, reduce energy use per square foot of U.S. buildings by 30%, with a longer term goal of achieving a 50% reduction, relative to a 2010 baseline.

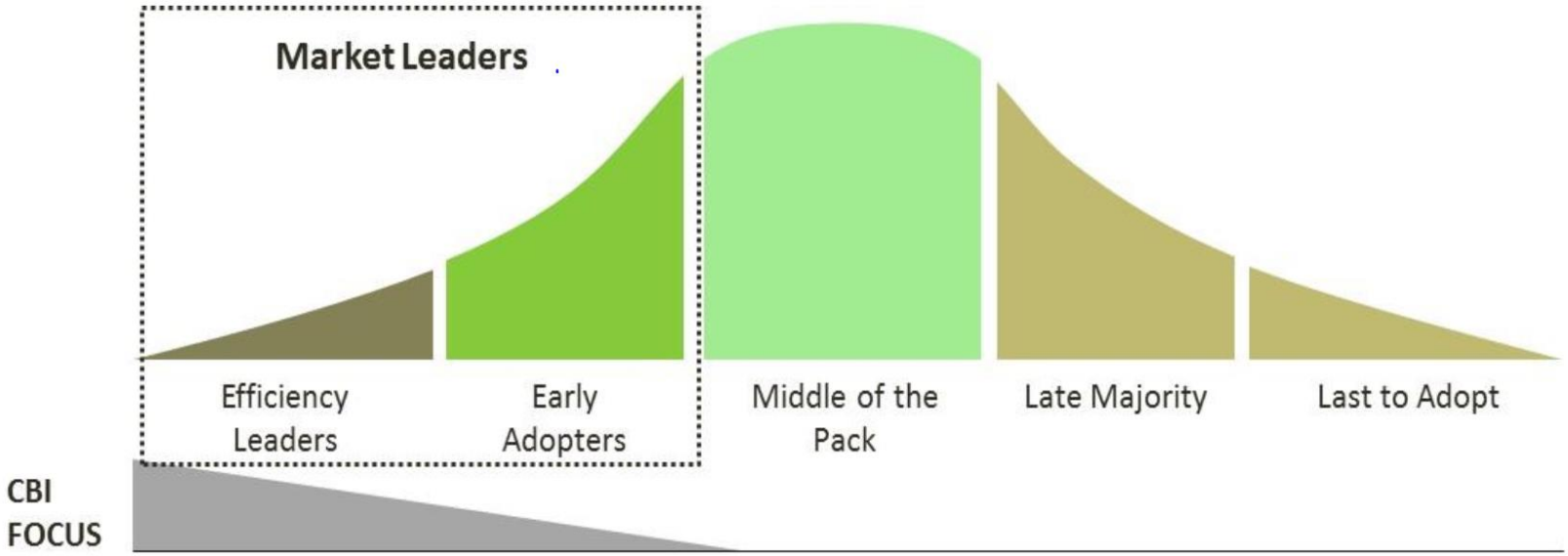
Visualizing BTO's Goals Framework



CBI Interim Market Goal



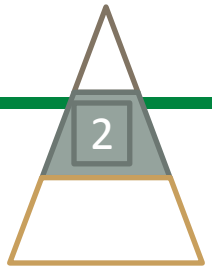
By 2025, at least 20% of commercial building floor area will have an average EUI at least 35% lower than the EUI of typical commercial buildings in 2010.



CBI's diffusion of innovation (based on Rogers, 1983)

Graphic Source: BTO MYPP

CBI Interim Market Goal



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Existing

By 2025, commercial buildings built before 2010 and owned by market leaders, representing at least 20% of the U.S. commercial building floor space, should on average consume 30% less energy than an average commercial building in 2010.

New

By 2025, 20% of the new commercial floor area will be designed and built to consume 50% less energy per sq. ft. than the average commercial building in 2010.

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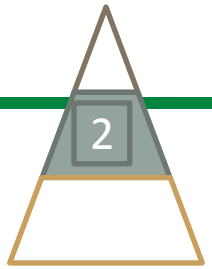
RBI Goal



By 2025, reduce the energy used per square foot for space conditioning and water heating in single-family homes by 40% from 2010 levels.

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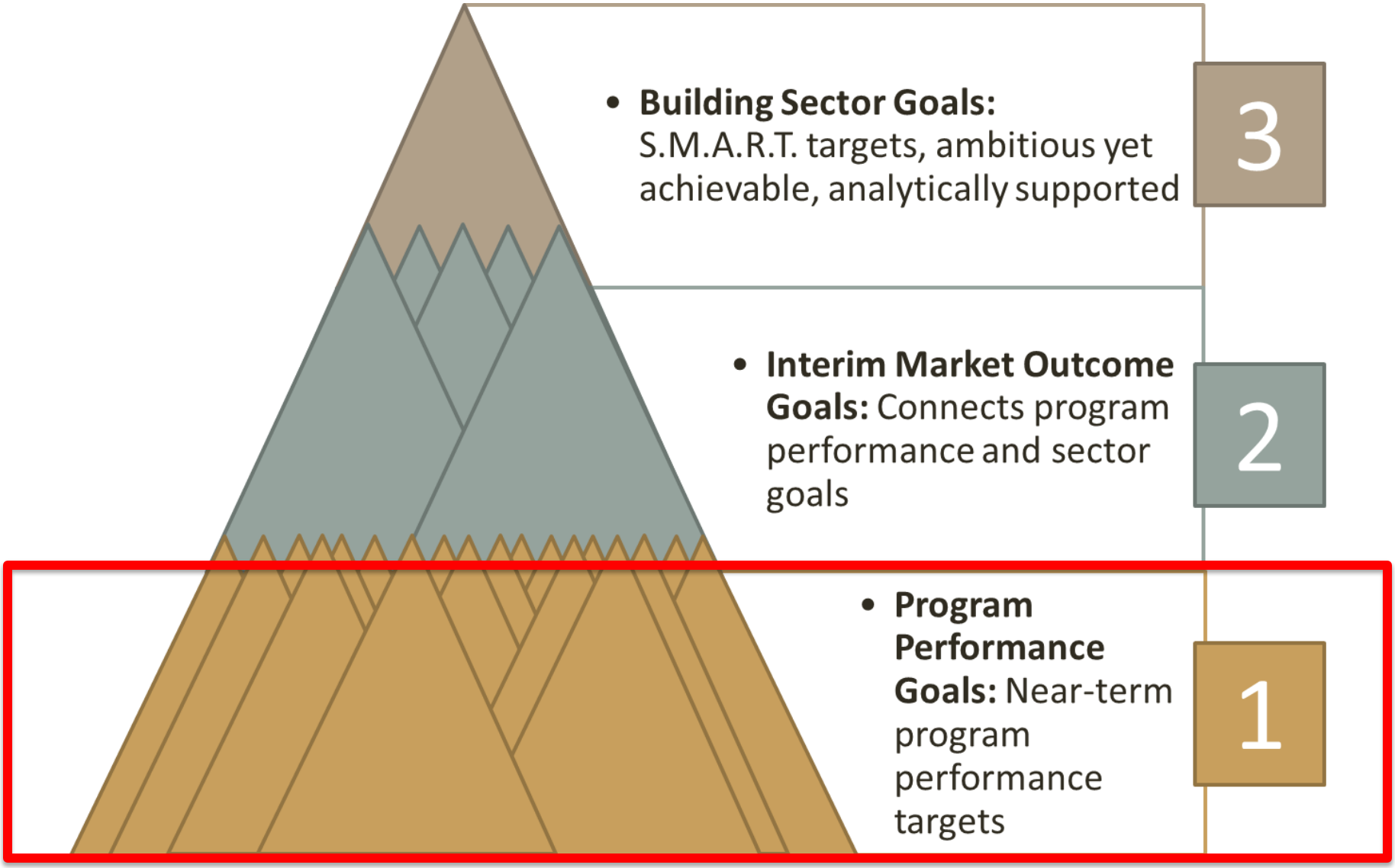
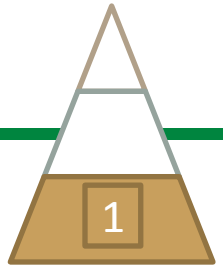


RBI Program Performance Goal



Proving Whole-House Solutions at Scale for Existing Homes

Prove to homeowners and energy efficiency programs that it is possible to cost-effectively reduce the average energy use intensity of homes by at least 25% by 2020 by **enabling upgrades of at least 1 million homes** through whole-house upgrade programs that focus on reducing heating, cooling and water heating loads.

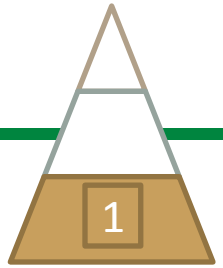
Primary Data Sources:

- Home Performance with ENERGY STAR
- Better Buildings Neighborhood Program (historical data)

Primary Data Needed for Goal Analysis:

- Number of homes upgraded

RBI Program Performance Goal



Proving Whole-House Solutions at Scale for New Homes

Demonstrate to the housing industry that it is possible to cost-effectively reduce the average energy use intensity of new homes by at least 40% by 2020, relative to the average EUI of existing homes in 2010 while improving performance (e.g., comfort, health, safety, and durability) by **certifying at least 50,000 high performance homes** across all major climate zones.

Primary Data Sources:

- DOE Zero Energy Ready Home Program
- DOE Challenge Home (historical)

Primary Data Needed for Goal Analysis:

- Number of homes certified and location

Goals – Wrap up

- Different goals at different levels support each other
- Goals share common elements, but each is tailored to BTO program strategies
- We are assessing BTO's progress toward these goals

Q&A with Panel:

***Joanne Lowry** – BTO*

***Jack Mayernik** – NREL*

***Jared Langevin** – LBNL*

***Ben Polly** – NREL*

THANK YOU

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